

BACKGROUND

Pulse oximetry serves as a marker of the physiological status of the body's internal environment. The pulse oximeter has a red, infrared light that passes through the nail and finger to determine the percentage of oxygen that is being carried by the red blood cells (hemoglobin) (DeMeulenaere, 2007). By using this noninvasive measuring tool, healthcare professionals are able to determine the amount of oxygen carried by the hemoglobin molecules to the tissues and cells of the body (Casey, 2001). Disease processes affecting perfusion and circulation can contribute to lower SpO2 levels. In addition, healthcare providers have also been taught that nail polish could contribute to altered SpO2 results. There has been many articles such as "Do's and Don'ts: Performing Pulse Oximetry" that have advised against doing pulse oximeter readings with artificial nails or nail polish, however, other articles have counteracted this approach and conclude that nail polish does not have much significance in readings. During this research, we sought to determine, through extensive review of articles, whether or not nail polish or artificial nails affected pulse oximeter results.

SpO ₂ , %	PaO ₂ , mm Hg	Oxygenation Status
95-100	80-100	Normal
91-94	60-80	Mild hypoxia
86-90	50-60	Moderate hypoxia
Less than 85	Less than 50	Severe hypoxia

Figure 1 Pulse Oximetry Values and their Meanings

AIM

The aim of the literature review was to discover whether studies in the past were able to confirm or refute if there is statistical significance in pulse oximetry readings conducted with nail polish and/or artificial nails. Upon review of the research, we read studies conducted on relatively healthy individuals with baseline pulse oximetry readings between 95-100%.

METHODS

Databases used to conduct this literature review were EBSCOhost and ProQuest. Keywords used in search were "Effect of Nail Polish on Oxygen Saturation". The search criterion was for articles posted from 2005-2016 and of English language. Fourteen articles were considered. Out of these fourteen articles, there were seven which had provided information meeting our inclusion criteria. Scholarly journals are from Intensive and Critical Care Nursing and The Journal for Nurse Practitioners.

Inclusions: Article studies that focused on a variety of polish colors (wine, white, brown, pink, blue, red – among – others– and a clear top coat), test subjects of both genders, using more than one brand of pulse oximetry meters (for comparison), age range 15-55, high altitude studies, relatively healthy subjects (with standing pulse ox of at least 95% or above), test subject sample size of at least five or more, studies that included non-nail polish digit as a control, studies of subjects with asthma, studies that conducted several trial phases.

Exclusions: Peer reviewed articles, articles that focused on nail enhancements exclusively, studies done before the year 2005, studies that included subjects with impaired blood circulation to arms and legs (history of heart disease, history of diabetes, and history of cardiovascular problems), and studies with subjects who were frequent smokers.



Choice Med Pulse Oximeter. (n.d.). Retrieved from <http://www.dirionards.com/choice-med-pulse-oximeter/21056.cfm>



Z. (n.d.). Red Nail Polish in Application (Photograph found in Creative Commons Attribution). Retrieved from https://commons.wikimedia.org/wiki/File:Red_nail_polish_in_application.jpg (Originally photographed 2010, June 20)

FINDINGS

A collective theory was made from the literature review that revealed significant differences in digit pulse oximetry readings after applying nail polish based on our academic teaching and clinical rotation practice guidelines.

- The bulk of the articles noted differences in pulse oximetry readings relating to both the different machines and nail polish colors used.
- The research indicated, although deviations in readings were noted, majority of the studies heeded that the variance among pulse oximetry readings were not clinically significant enough—on average 0.5 or ≤ 2% discrepancy— to pose an issue when providing care
- These studies indicate that modern technology may be able to elude the interference caused by wearing nail polish when performing readings.

DISCUSSION

Based on the reviewed research studies, we have come to find that the discrepancies in pulse oximetry readings with and without nail polish were off by no more than 2% (Rodden, 2006; Yamamoto, 2008). Though there is a difference in values, is this sufficient to conclude that the data is significant and therefore, nail polish must be removed from the fingernail in order to obtain a correct reading? Health care workers must take into consideration that costs of supplies, time, and possible patient distress are attributing factors with the removal process of the nail coatings. In the studies reviewed, most test subject demographics were young and healthy females (Sütcü, 2010; Yönt, 2013). With the focus mainly on this population, there is uncertainty of whether these studies are applicable across all age groups and health statuses. In addition, with these studies conducted, nail polish was applied the day of the study. Will testing the pulse oximetry days after nail polish has been applied provide any significant alterations in the readings? Implications for the future would be to measure pulse oximeter readings in both male and female participants.

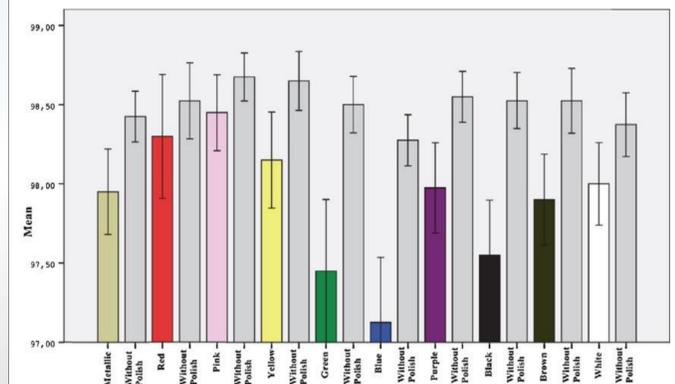


Figure 2 Statistical differences in pulse oximetry readings of fingernails, with and without nail polish.

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